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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte MARTIN HAUBNER and ROLF PINKOS

Appeal 2009-0449
Application 10/537,962
Technology Center 1600

Decided:[1] March 11, 2009

Before TONI R. SCHEINER, ERIC GRIMES, and LORA M. GREEN, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge.*

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a process for preparing polyoxyalkylene glycols. The Examiner has rejected the

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

STATEMENT OF THE CASE

The Specification discloses "a process for preparing polyoxyalkylene glycols of a certain molecular weight in one stage" (Spec. 2). The Specification discloses that the "use of water, comonomer, butanediol or butanediol-water mixtures to terminate the copolymerization makes possible not only synthesis of THF [tetrahydrofuran] copolymers of certain molecular weights, but results in a heteropolyacid-containing catalyst phase which can be reused, for example by recycling" (*id.*).

Claims 1-11 are pending and on appeal. Claim 1 is the only independent claim and reads as follows:

Claim 1: A process for preparing polyoxyalkylene glycols of [sic] comprising

copolymerizing, in one stage, tetrahydrofuran and alpha, omega-diols with the exception of butanediol as the comonomer in the presence [of] a heteropolyacid and of a hydrocarbon,

distilling off a mixture of water and the hydrocarbon from the copolymerization, and

terminating the polymerization by adding water when a molecular weight of from 1,000 to 2,800 is attained.

OBVIOUSNESS

Issue

The Examiner has rejected claims 1-11 under 35 U.S.C. § 103(a) as being obvious in view of Kodama[2] and Weyer.[3]

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[2] Kodama, EP 1361243A1, Nov. 12, 2003.
[3] Weyer et al., US 5,395,959, Mar. 7, 1995.

The Examiner finds that Kodama discloses making "oxytetramethylene glycol copolymer (i.e., polyoxyalkylene glycol) by copolymerizing tetrahydrofuran and neopentyl glycol in presence of heteropolyacid catalyst" to obtain oxytetramethylene glycol copolymer with a molecular weight from 800 to 5000 (Ans. 4-5). The Examiner also finds that Kodama discloses a saturated hydrocarbon in the reaction mixture (*id.* at 4, citing Kodama, claim 5). The Examiner finds that Kodama does not "expressly teach the termination of the polymerization reaction by adding water" (*id.* at 5) but concludes that Weyer in combination with Kodama would have suggested the claimed invention (*id.* at 6).

Appellants contend, among other things, that the Examiner erred in concluding that the combination of references suggests copolymerizing tetrahydrofuran and alpha, omega-diols in the presence of a hydrocarbon (Reply Br. 2-3).

The issue with respect to this rejection is: Does the evidence of record support the Examiner's conclusion that the combination of references suggests the step of "copolymerizing tetrahydrofuran and alpha, omega-diols … in the presence of … a hydrocarbon," as required by the claims?

Findings of Fact

1. Kodama discloses that an oxytetramethylene glycol copolymer

> can be easily produced by subjecting tetrahydrofuran and neopentyl glycol to a copolymerization reaction in the presence of a heteropolyacid catalyst, while continuously removing from the reaction system water which is by-produced in the copolymerization reaction so that the amount of water is adjusted to a level wherein a two-phase reaction system is formed which comprises an organic phase comprising a

> solution of neopentyl glycol in tetrahydrofuran …, and a tetrahydrofuran/aqueous heteropolyacid phase.

(Kodama 4, ¶0011.)

2. Kodama discloses "a purification process which can be performed after producing a copolymer," in which "a saturated hydrocarbon having 6 to 10 carbon atoms … is added to the organic phase to thereby remove the residual catalyst" (*id.* at 14, ¶0064-0066).

3. Kodama discloses that "[w]hen raw material monomers containing a saturated hydrocarbon is reused in the copolymerization reaction, the saturated hydrocarbon may cause an adverse effect on the copolymerization reaction rate. Therefore, it is necessary to separate and remove the saturated hydrocarbon from the recovered raw material monomers before reusing the recovered raw material monomers" (*id.* at 20, ¶0115).

4. Kodama's claims 4 and 5 read as follows:

> 4. A method for purifying an oxytetramethylene glycol copolymer, obtained by copolymerizing tetrahydrofuran and a diol … from a copolymerization reaction mixture comprising an oxytetramethylene glycol copolymer and the unreacted diol, which comprises subjecting said reaction mixture to continuous distillation in the presence of fresh tetrahydrofuran …, to thereby distil off said unreacted diol from said reaction mixture together with said added tetrahydrofuran.
>
> 5. The method according to claim 4, wherein said reaction mixture further comprises a saturated hydrocarbon having 6 to 10 carbon atoms.

(*Id.* at 41-42.)

Principles of Law

"In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant." *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993).

Analysis

Claim 1 is drawn to a method comprising, among other steps, "copolymerizing, in one stage, tetrahydrofuran and alpha, omega-diols … in the presence [of] a heteropolyacid and of a hydrocarbon." Thus, claim 1 requires that the polymerization is conducted in the presence of a hydrocarbon.

The Examiner relies on Kodama's claim 5 as disclosing the claimed polymerization step in the presence of a hydrocarbon. As we understand it, the Examiner's reasoning is that the reaction mixture recited in Kodama's claim 5 is a polymerization reaction mixture that contains a hydrocarbon.

Appellants contend that the Examiner erred in concluding that the references suggest "copolymerizing in one stage tetrahydrofuran and alpha, omega-diols … in the presence [of] … a hydrocarbon" (Reply Br. 2-3). Appellants specifically argue that Kodama discloses "the addition of the hydrocarbon, *in a separate step*, to remove the catalyst" (*id.*), not including hydrocarbon at the beginning of the polymerization reaction as required by the instant claims (*id.* at 2).

We agree with Appellants' position. Although Kodama's claim 5 refers to a reaction mixture that contains a hydrocarbon, the reaction mixture

is being subjected to a purification step after polymerization is complete, and is not a reaction mixture in which polymerization is being conducted. Although claim 5 of Kodama, when read in isolation, is somewhat ambiguous, Kodama's specification discloses that hydrocarbons are used in a purification step to precipitate catalyst, not in the initial polymerization reaction mixture. In fact, Kodama discloses that saturated hydrocarbon, if added in a purification step and recycled into the reaction mixture with recycled reactants, may cause an adverse effect on the copolymerization reaction rate and thus it is necessary to separate and remove the hydrocarbon from the recycled reactants before reuse.

Because Kodama discloses that the hydrocarbons of claim 5 are added in a purification step, not the polymerization step, the Examiner has not adequately explained how the combination of Kodama and Weyer suggests polymerization in the presence of a hydrocarbon, as required by claim 1.

CONCLUSIONS OF LAW

The evidence of record does not support the Examiner's conclusion that the combination of references suggests the claimed method step of "copolymerizing tetrahydrofuran and alpha, omega-diols … in the presence of … a hydrocarbon."

SUMMARY

We reverse the rejection of claims 1-11 under 35 U.S.C. § 103(a) as being obvious in view of Kodama and Weyer.

REVERSED

Ssc:

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